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CHICAGO 16, ILLINOIS

GAS ABSTRACTS

VOLUME 8, NUMBER 7

JULY, 1952

AFFILIATED WITH

ILLINOIS INSTITUTE OF TECHNOLOGY

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GAS ABSTRACTS is published and distributed monthly by the Institute of Gas Technology, Chicago 16, Illinois. The contents of selected papers and patents are reviewed impartially by the editorial staff and material of potential interest to the Gas Industry is presented. Subscription rates to non-members of the Institute: $15.00 per year.—Printed in the U.S.A.

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A special microfilm edition of Gas Abstracts can be supplied by University Microfilms, 313 N. First St., Ann Arbor, Michigan.

1. GAS INDUSTRY

Canadian Gas Imports

ALBERTA BOARD SUBMITS DATA ON PACIFIC NW EXPORT OKAY. *Am. Gas J.*, **176**, 48-49 (1952) May.

The Alberta Petroleum and Natural Gas Conservation Board, finding estimated proven reserves of natural gas in Alberta were 6.8 trillion CF as of Dec. 31, 1951, recommended that Westcoast Transmission Company be permitted to export 300 billion CF from the Dominion to the U.S. Pacific Northwest. The Board decided that at present gas can be exported from only the Peace River Area, at the rate of 42 billion CF for five years, at the end of which time the matter would be reviewed. Westcoast's proposed pipeline, with an ultimate yearly capacity of 123 billion CF, is now dependent on obtaining an FPC certificate for construction of the U.S. portion of the line. A. E. Neumann

Cooperative Education

Nichols, W. T. INDUSTRY AND COLLEGE CAN COOPERATE. *Chem. Eng. Progress*, **48**, 201-206 (1952) April.

Methods whereby industry and colleges can cooperate in the educating of engineers are presented. Suggestions include: Financial aid to schools and students by support of fellowships, professorships, donation of equipment; nonfinancial aid as use of technical movies made by industry, use of technical personnel for conducting seminars or case studies on design and operating problems and conducting plant trips, and offering industrial jobs to professors for selected periods of time. The "St. Louis Plan" of the American Institute of Chemical Engineers involves extensive use of industrial personnel for a series of lectures on design.

J. D. Parent

Distribution Safety

Jones, G. W., Platt, D. H. and Berger, L. B. INVESTIGATION OF GAS EXPLOSIONS IN BRIGHTON, N.Y., SEPTEMBER 21, 1951. U.S. Bureau of Mines Report of Investigations 4878 (1952) April.

A survey of conditions previous to and prevailing at the time of the gas explosions is presented. Recommendations to prevent recurrence included (a) individual service regulators with excess pressure relay vent discharging to the outside atmosphere, (b) individual curb shutoff valves in all new installations, and (c) separate pits for high and low pressure regulators.

D. L. Nicol

FPC Regulatory Trends

Buchanan, T. C. TRENDS IN FEDERAL POWER COMMISSION REGULATION. Public Utilities Fort., **49**, 750-753 (1952) May.

The author, chairman of the FPC, reviews the 32-year history of the Commission, and types of cases which predominated at various periods. Today natural gas cases occupy first place, with emphasis on regulation of natural gas rates. The FPC docket now contains applications for rate increases totaling over $170,000,000. Reasons given for increase in natural gas rates may be classified, 1) inflation, 2) taxes, and 3) price of gas in the field. A. E. Neumann

Gas Economics

Nickling, T., and Redman, M. THE ECONOMICS OF GAS PRODUCTION—I. *Gas World* (British), **85**, 385-388 (1952) April 19.

Factors influencing the cost of gas into the holder may be grouped under two headings (a) those affected by operating results (b) those affected by capital and raw material costs. These factors are treated in extensive calculations of comparative costs for horizontal retorts, intermittant verticals and continuous vertical retorts, for installations of various sizes. Explanatory discussions are given of gas therms per ton, calorific value, dilution gas, plant size and grouping. O. P. Brysch

Gas Heating Demand

Boasi, L. J. GAS HEAT BOOM TOWN IS BORN. *Gas Heat*, **3**, 24, 46 (1952) April.

Since 1946, 115,000 Chicagoans have applied for gas heat. 30,000 will be allowed to install gas heat during 1951-52 heating season. By the winter of 1952-53, 99,000 will be served with gas heat. B. G. Lang

2. APPLIANCES

Househeating Burner

Plass, R. B., and Bingham, E. M. (assignors to Ray Oil Burner Co.) GAS BURNER. U.S. 2,594,797 (1952) April 29.

A dual purpose gas-oil burner for househeating furnaces is described. Better mixing of blower-supplied primary air and gas is obtained by angular impinging jets of gas and air.

D. L. Nicol

Interchangeability

Nicol, D. L., Brown, R. A. and Linden, H. R. INFLUENCE OF SUBSTITUTE GAS COMPOSITIONS ON INTERCHANGEABILITY WITH NATURAL GASES. Paper No. PC-52-7 Amer. Gas Assoc., New York (1952) May.

This study presents an analysis of the combustion performance of oil gas and oil gas-natural gas mixtures substituted for two natural gases at the adjustment manifold pressure on seven selected critical appliance burners adjusted to soft, medium and hard flame settings on each of the two natural gases. This study also includes an analysis of the combustion performance of the two natural gases, one a high-inert type and the other a high-methane type, and various oil gases, scrubbed and unscrubbed, of varying aromatic content and heating value, diluted to a heating value of 1000-1050 Btu/Scf with a synthetic blow-run gas (composed of 80% nitrogen and 20% carbon dioxide). The degrees of substitutibility of the oil gases for the two natural gases and of the natural gases for selected oil gases are reported. The substitutability of the oil gases for each of the natural gases after adjustment of the burners at rated input on the natural gases is given in terms of the maximum percent oil gas in the oil gas-base gas mixture which exhibited satisfactory combustion performance on these critical burners. Correlations are presented relating the substitutibility of the oil gas with the true (diluent-free) oil gas heating value.

Authors' Abstract

Space Heater

Cartter, W. G. (assignor to Affiliated Gas Equipment, Inc.) FUEL BURNING PANEL HEATER. U.S. 2,594,608 (1952) April 29.

A unit space heater designed for overhead installation is described. Novel features include the principle mode of heat transfer by radiation. This method eliminates the drafts caused by fan blowers and assures an equal distribution of heat for greater areas.

D. L. Nicol

3. COMBUSTION AND INDUSTRIAL FURNACES

Blast Furnace Synthetics

Bradley, J. M., and Ogorzaly, H. J. (assigned to Standard Oil Development Co.) BLAST FURNACE OPERATION. U.S. 2,593,257 (1952) April 15.

By using a steam-oxygen blast and injecting excess carbonaceous fuel in pulverized form, a modified blast-furnace technique is claimed which will yield pig iron, synthesis gas and hydrocarbon synthesis in one vessel. Control of oxygen and steam injection provides temperature control of the upper levels of the furnace so that the ore (with promoter) acts as a catalyst to produce higher hydrocarbons.

O. P. Brysch

Domestic Heating

K. C. Richmond. HEATING AND FUEL MARKETS: APARTMENT HOUSES. *Coal-Heat*, 14-15 (1952) April.

The author continues his review of the fuel markets as estimated from the 1950 Census of Housing. Of the 45,875,000 dwelling units, the 5,082,000 units for 5 or more families have been sampled. A probable national estimate indicates 60% use coal, 30% oil and 10% gas, while for the North Central States in a sample of several hundred apartment houses, 83% used coal and 71% were stoker fired.

O. P. Brysch

Galvanizing Furnaces

Thruston, A. M. GAS FIRED GALVANIZING FURNACES. *Ind. Gas*, 30, 10-13 (1952) May.

Data for furnace design and galvanizing pot design are presented to obtain optimum efficiencies and heat-up times. The paper covers the use of six common types of gas burners used in firing (1) radiant, (2) impact, (3) luminous, (4) turned, (5) radiant elbow, (6) direct immersion.

D. L. Nicol

Industrial Furnaces

GAS APPLIANCES FOR INDUSTRY AT B.I.F. NEW CRUCIBLE FURNACE AMONG EXHIBITS. *Gas World* (British), 25, 35 Suppl-38 (1952) April 19.

A new design for crucible furnaces is described that makes use of radiant burners instead of tangent oil firing. Advantages of this new design are increased thermal efficiency and better heat control. D. L. Nicol

Producer Gas Turbine

Sedille, M. H. and Menard, P. H. (assigned to Societe Rateau (Society Anonyme) GAS TURBINE ENGINE ASSOCIATED WITH A GAS PRODUCER UNDER PRESSURE. U.S. 2,592,749 (1952) April 15.

A gas producer operating under pressure is arranged with a gas turbine so as to permit the producer gases after purification to enter directly into a combustion chamber, the burnt gases being used to drive the turbine.

E. J. Pyrcioch

Sonic Dust Removal

Soderberg, C. R., Jr. INDUSTRIAL APPLICATIONS OF SONIC ENERGY. *Engineers' Digest* (British) 13, 151-153 (1952) May.

The use of sonic energy for removal of dust from gases is described. The sonic collection system consists essentially of an agglomerator chamber, a sonic wave generator driven by compressed air, and a secondary collector. Particle agglomeration and precipitation occurs in the agglomerator chamber due to action of sonic waves. Large particles of 5-10 microns to which small particles can adhere must be present in order that agglomeration take place. Pilot plant performance data on the collection of carbon black, sulphuric acid mist, and open-hearth fumes are included. E. J. Pyrcioch

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Dugger, G. L. FLAME SPEEDS FOR METHANE-AIR MIXTURES AT LOW TEMPERATURES. p. 138

Penner, S. S. SPECTROSCOPIC STUDIES OF LOW PRESSURE COMBUSTION FLAMES. p. 138

4. CARBONIZATION AND GASIFICATION

Carbon Structure

Smith, T. D. AMORPHOUS CARBON. *J. Chem. Soc.* (London), 923-927 (1952) March.

X-ray diffraction and gas adsorption studies were made on residues of carbonization (from 400° to 1000° C.) of high-oxygen organic compounds. These included mellitic acid, barium and mercury mellitates, inosotol, benzenepentacarboxylic acid, quinol humic acid, methyl humic acid, melanoidin and oxidized vitrain. The a-dimension of the crystallite showed a growth from 20 to 32 Angstroms with rising carbonization temperature. The c-dimension, however, showed no such growth, which indicates a rigidity in the structure probably due to oxygen in the cross-linking between lamellar planes. This is in contrast to growth found in carbons from low oxygen compounds such as coals and pitch. Wide variations in the surface areas (by BET method) were found. O. P. Brysch

CO_2 Extraction

Bridges, R. (assignor to Air Reduction Co., Inc.) PRODUCTION OF CARBON DIOXIDE. U.S. 2,593,530 1952) April 22.

This process for CO_2 utilizes a liquid or gaseous fuel burned with air or enriched air under pressure. The combustion gases are used to drive a gas turbine which recovers energy from the combustion process to furnish power in any one of several forms for the remainder of the process. After the gas turbine the CO_2-rich gas is absorbed with any conventional means and the CO_2 recovered. Tail gas from the absorber is expelled to the atmosphere. W. G. Bair

Taylor, J. E. and Haslam, J. H. (assignors to The Girdler Corp.) SEPARATION OF CARBON DIOXIDE FROM GASES. U.S. 2,592,762 (1952) April 15.

An improved process for separating acidic gases from gaseous mixtures using aqueous monoethanolamine solutions is described. The fog in the effluent gas which contains amine stripped from the absorbent is treated by heating the effluent gas and then cooling it by scrubbing with an aqueous spray, thus aiding in the recovery of amine. C. E. Hummel

Carbonization Research

Smith, F. W. and Brown, R. L. HOW DOES COAL COKE? Paper No. PC-52-15 Amer. Gas Assoc. Conf., New York (1952) May.

In order that a well-fused coherent coke result from the several chemical and physical processes occurring during the heating of bituminous coals, the authors formulate the requirements that (1) an appreciable fraction of the coal material must fuse at an elevated temperature (2) simultaneous decomposition and polymerization must occur at the fusion temperature and (3) the vapor pressure of the fluid material must be quite low. The results of earlier workers are analyzed to show their agreement with the above concept of coking, especially with regard to softening temperature, decomposition temperature, rate of heating and character of coke. Much investigation of the primary chemical and physical processes involved in coking is needed to develop a better understanding of the mechanism.

O. P. Brysch

Catalytic Reforming

Riesz, C. H., Dirksen, H. A. and Pleticka, W. J. IMPROVEMENT OF CATALYSTS AND CATALYST SUPPORTS. Paper No. PC-52-8 Amer. Gas Assoc., New York (1952) May.

Catalytic cracking, initially developed for peak-load gas production, has more recently become an important base-load gas production operation in the catalytic conversion of natural gas. Factors which may provide decreased investment costs thus become vital. Improved catalyst effectiveness is one element in increasing plant capacity. A laboratory and pilot-plant study of supports for nickel cracking catalysts revealed periclase (fused magnesium oxide) to be particularly effective; certain alumina preparations and selected refractory compositions were also found useful. Addition of small amounts of magnesium oxide or aluminum oxide promotor to the nickel, by coimpregnation, enhanced the activity of stable but relatively low-activity catalyst preparations. Possible decreases in nickel concentrations were indicated as a means of conserving nickel in case of limitations in supply.

Authors' Abstract

Smoker, E. H. THE UGI CYCLIC CATALYTIC REFORMING PROCESS — RECENT DEVELOPMENTS. Paper No. PC-52-22 Amer. Gas Assoc. Conf, New York (1952) May.

The UGI Cyclic Catalytic Reforming Process has been highly successful in reforming natural gas. Recently the process has been adapted to the reforming of butane. This paper discusses in some detail the various aspects of butane reforming. The successful utilization of butane in the CCR units considerably widens the field of usefulness for this type of gas making equipment. H. A. Dirksen

Coal Cleaning

Myers, E. M. THE UPGRADING OF MINERALS, WITH SPECIAL REFERENCE TO COAL. *Chem. and Ind.* (London) 278-286 (1952) March 29.

This lecture, presented at the Society Jubilee, 1951, opens with a historical account of mining, development and use of coal in Britain from 1180. Influence of mining practice and mechanical handling on the nature of coal impurities is discussed: Selection of coal preparation processes includes comparisons of hand and mechanized processes. Dense media, jigs, tables, dry cleaners, froth flotation and cyclones are discussed in considerable detail. Applications of these processes to concentration of certain minerals are also described. O. P. Brysch

Coal Constitution

Klepetko, E., Kaye, P. B., Bauer, and Hartzell, L. J., Jr. RECOVERY OF RESINS FROM COAL. U.S. 2,591,830 (1952) April 8.

By adding a flotation reagent (alcohol, phenols, pine oil) to Utah coal fines, and passing these as an aerated water pulp to a conventional hydroseparator or other sedimentation apparatus, the coal resins are concentrated in a froth which is skimmed from the surface. O. P. Brysch

Gas Purification

Thompson, R. J. S. CONTINENTAL PRACTICE IN THE TREATMENT OF COAL GAS. *Gas World*, 135 *Coking Sect.* 37-41 (1952) April 5.

Except for lower sulfur content of gas, high cost of oils and use of high-pressure grid systems and of coke oven gas, actual practice in Continental works is similar to best English

practise. Newer developments include Koppers pressure-tar-separation (large separating surface, 60 to 100° C., above atmospheric pressure), tall stacked horizontal-tube condensers and high speed centrifugal exhausters. Hydrogen sulfide removal in general is achieved by the dry iron-oxide process. Tower purifiers and deep, multiple-layer purifiers are popular. A tower of prepared spheres of Lux oxide (Kohlentechnik) with outside revivification is used at Concordia. Four solvent extraction plants for oxide are operating, but are uneconomic at present sulfur prices. Ruhrgas purification specifications are discussed. The Thylox process is widely used, but the pressure-potash liquid purification process with Claus kiln S recovery is the cheapest recovery method in Germany (oxide-towers 2.5, KOH 2.0, marks/Mcf). In benzol recovery, gas-fired pipe stills are used for heating up to 200° C. O. P. Brysch

Watson, K. M. (assignor to Sinclair Refining Co.) PROCESS OF CONCENTRATING OR PURIFYING CARBON MONOXIDE OCCURING IN ADMIXTURE WITH OTHER GASES. U.S. 2,593,232 (1952) April 15.

A system for concentrating carbon monoxide by reacting the carbon monoxide with a large surface of nickel at temperatures from 40° to 200° C. and then decomposing the nickel carbonyl to release the carbon monoxide and regenerate the higher surface-area of nickel is claimed. W. J. Pleticka

Hydrocarbon Gasification

Morgan, J. J. GASIFICATION OF HYDROCARBON FOR PRODUCTION OF GASES TO SUPPLEMENT NATURAL GAS IN CITY SUPPLIES. *Gas Age*, **109**, 49-54 (1952) May 8.

This is the first of a series of review articles on gasification of hydrocarbons. A brief historical treatment is given of the various processes for making standby supplementary or regular gas for mixing with the available natural gas supplies. The requisites of a supplementary gas are outlined, and some discussion given to rebuilding old or selecting new equipment to suit the needs of a gas company. O. P. Brysch

Odell, W. W. MANUFACTURE OF COMBUSTIBLE GAS. U.S. 2,592,591 (1952) April 15.

This patent relates to the production of fuel gases of 150 to 800 Btu/SCF in a two-shell regenerative gasification unit operable at elevated pressures and operated cyclically. Each of the reactors contain two or three beds of refractory shapes. The following examples for gas production are given: (1) Use of liquid hydrocarbons, steam and oxygen for production of water gas; production of city gas with fuel oil and steam; reforming gaseous hydrocarbons without carbon-black formation. H. R. Linden

Hydrogen Diffusion

Schwertz, F. A. (assigned to Koppers Co., Inc.) PROCESS OF SEPARATING GASES BY DIFFUSION. U.S. 2,589,297 (1952) March 18.

This invention provides a method of separating light constituents such as hydrogen from gas by diffusion. A condensible vapor is used to sweep the light constituent and is condensed in the diffusion zone. The author claims a higher separation of light constituents could be achieved by this procedure than in the case of ordinary diffusion. This invention is specifically suited for separating hydrogen from the high-hydrogen manufactured gases.

D. C. Gami

Industrial Oxygen

OXYGEN IN INDUSTRIAL HEATING AND GASIFICATION. PART TWO. *Coke and Gas* (British) **14**, 140, 141, 146 (1952) April.

This is Part Two of a series dealing with the use of oxygen in industry, the production and cost of oxygen being considered in this article. The cost and method data presented are mainly those as gathered from information of The British Oxygen Company. For most industrial purposes first-grade oxygen (99.5% purity) is not required and less costlier "medium-purity" oxygen (85-98% purity) can be used. A flow diagram for the production of such medium-purity oxygen, known as the Rescol process is included.

E. J. Pyrcioch

Methane from Mines

Minchin, L. T. METHANE FROM COAL MINES. PART II. *Coke and Gas* (British), **14**, 131-135 (1952) April.

This article continues the series on methane recovery and drainage from coal mines. Recovery data and diagrams of borehole arrangements are given for various methods practiced in Eng-

land and Europe to date: (1) boreholes in roof (2) headings in overlying seam (3) pack cavity (4) drainage of underlying virgin seam (5) drainage of old workings (6) collection from blowers. The descriptions are based on the Report of the Joint Working Party (Min. of Fuel and Power, and N.C.B.) "Drainage of Fire Damp from Mines." (See also Gas Abstracts 8, 94 (1951) May.) O. P. Brysch

Minchin, L. T. METHANE FROM COAL MINES. Part III. *Coke and Gas*, **14**, 167-173 (1952) May.

This final article of the series discusses the three areas in Europe where systematic mine methane drainage and utiliation is practiced. Of 18 mines in the Saar coal-field, 15 employ methane drainage and utilization is practiced. Two are in construction. Of the 3.3 MMCF/day total, much is used for driving compressors on the coke-oven gas grid or for heating coke ovens. In the Ruhr-Aachen area, 12 out of 14 mines were draining methane to surface, but only half of this is utilized. In the Mons-Charleroi area in Belgium, 14 mines are connected and 8 are planning connection to the pipeline network of the Distrigaz S.A., national pipeline company. An American plant for catalytically cracking 1.75 MMCF/day to city gas for the grid is completed. "Grid" maps, statistics and illustrations of equipment are given.

O. P. Brysch

Oil Gas

Hammond, G. M. PROBLEMS ENCOUNTERED IN THE OPERATION OF A STAND-BY HIGH BTU OIL GAS PLANT. Paper No. PC-52-14, Am. Gas Assoc., Operating Section, New York, May 1952.

A discussion of personnel, maintenance, corrosion and utilization problems encountered in the operation of the Grand Rapids 2-machine high-Btu oil gas standby plant of the Michigan Consolidated Gas Company. H. R. Linden

Linden, H. R., Guyer, J. J., Hall, C. A. M., and Riesz, C. H. PRODUCTION OF OIL GASES AS SUBSTITUTES FOR NATURAL GAS. Paper No. PC-52-13, Am. Gas Assoc., Operating Section, New York (1952) May.

Three methods for producing high-Btu oil gases completely interchangeable with natural gases are discussed. These methods are: (1) Production of essentially aromatics-free, low-gravity and low true oil gas heating value oil gases containing a minimum amount of blowrun and blast gases. (2) Gasification of distillate or residual oils at pressures from 20 to 40 psig in present-day high-Btu oil gas equipment modified for moderate pressure operation during the make-oil admission period, or in novel continuous gasification equipment of the fluidized refractory bed or moving refractory bed (thermofor) type. The oil gases produced by this method may contain up to 65% methane-plus-ethane, and thus more nearly approach the composition of natural gas. (3) Catalytic upgrading of properly conditioned oil gases produced under present-day operating conditions with a hydrogenation catalyst at temperatures from 300 to 600° F. The net effect of this upgrading is similar to that of pressure gasification in that it produces a gas high in methane and ethane (up to 95% by volume) with an equivalent reduction of the hydrogen and olefins, primarily ethylene, in the original oil gas.

H. R. Linden

Sholar, J. O. EFFECTS ON SCRUBBING HIGH BTU GASES. Paper PC-52-9, Am. Gas Assoc., Operating Section, New York, May, 1952.

The results of two years' experience in light oil recovery from high Btu oil gas by the Columbia, S.C. plant of the South Carolina Electric and Gas Co. are presented. No operating difficulties in the production of 635,000 gallons of light oil equivalent to 0.81 gals./MCF are reported. The position of the light-oil scrubber is after the iron oxide boxes.

H. R. Linden

Pressure Gasification

von Fredersdorff, C. G. and Pyrcioch, E. J. THE CONTINUOUS PRESSURE GASIFICATION OF PULVERIZED COAL IN SUSPENSION. Paper No. PC-52-12 Amer. Gas Assoc., Operating Section, New York (1952) May.

The continuous pressure gasification of pulverized coal with air-oxygen-steam mixtures is being studied at a high-temperature slagging operation in a pilot plant designed for feed rates of 500 lb./hr. Reactor pressures of 25 to 75 psia with 21 to 70% oxygen concentration in

the gasifying medium were explored to determine the effects of the operating variables. Graphical correlations of gas heating values and process conversion efficiencies showed that optimum results at 70% oxygen concentration and 75 psia gasification pressure occurred between oxygen-coal ratios of 0.80 and 0.85 lb./lb., yielding a gas containing more than 70% combustibles, gasifying upwards of 90% of the carbon in the coal at a thermal efficiency of 70% and higher on the cold gas basis. Based on optimum gasification results, the raw material cost per MCF of CO + H_2 produced was estimated to vary between 14.5 to 16.2 cents, depending on the oxygen concentration used. Work is continuing to test the effects of 90% oxygen concentration and high steam-coal ratios at low gas residence times on the gasification results.

Authors' Abstract

Sulfur Recovery

Gamson, B. W. (assignor to Great Lakes Carbon Corp.) SULFUR RECOVERY. U.S. 2,594,149 (1952) April 22.

Improved yields above 75% of sulfur from H_2S-bearing gases are claimed by burning (noncatalytically) a mixture of 2 moles H_2S and 1 mole O_2 at 2400 deg. or above, then rapidly quenching the combustion gases at a rate of over 200 F/second by indirect (injecting a quench liquid) methods. O P. Brysch

Tar Dehydration

Laudani, H. REPORT OF TAR DEHYDRATION SUBCOMMITTEE. Paper No. PC-52-23 Am. Gas Assoc., Operating Section, New York, May 1952.

New developments in tar dehydration methods and equipment are reported. Included are the "Wire Drawing" process, the use of wetting agents and the use of steam syphon ejectors and Sharples centrifuges. H. R. Linden

Bambrough, R. O. WATER GAS TAR EMULSIONS. *Gas J.* (British), 270, 208, 214 (1952) April 23.

The production of tar emulsions can be reduced by either eliminating the causes of emulsion formation or employing methods of dispersion. Both the internal and external causes of formation and the subsequent method of elimination are discussed. Of the four methods of dispersion employed, the use of surface active agents is considered the most effective.

R. Parker

Water Gas

Haug, J. S. (assignor to United Engineers & Constructors, Inc.) METHOD OF AND APPARATUS FOR MANFACTURE OF CARURETTED WATER GAS. U.S. 2,595,252 (1952) May 6.

A method is claimed for preheating residual carburetting oils to temperatures of over 600° F. to permit higher proportions of the total oil requirements to be introduced in the blue gas generator. H. L. Linden

Rayner, J. W. GASIFICATION BY THE MOVING-BURDEN TECHNIQUE. *J. Inst. Fuel* (British), 25, 50-55 (1952) March.

The disadvantages are considered of the conventional method of making water gas by carbonization of coal to coke and subsequent gasification of the coke with steam, including the fact that it is applicable only to coking coals. German processes for production of water gas from low-rank coals such as lignites are reviewed. The introduction of the fluidized-solids process for catalytically cracking petroleum suggested a new technique which might be applied to gasification methods, and the first exploratory experiments by Imperial Chemical Industries, Ltd., led to a patent application in 1944. The three processes involved—carbonization, reaction between steam and coke, combustion of part of the gas or coke to provide heat for the reactions—were at first carried out in three inter-connecting vessels. A description is given of the semi-technical scale plant of this type installed at Billingham for the gasification of coke dust. In the later experiments, on the gasification of coal, a two-vessel system was adopted, in which carbonization and steaming are carried out together in the steaming vessel. Notes are given on the technical aspects, and a flow-sheet is included for a large plant operating this type of process. As long as there is a requirement for the steam by-product the process should be competitive with the conventional two-stage process. Author's Abstract

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Carbon Black

Howell, M. R. (assignor to Columbian Carbon Co.) PROCESS FOR COOLING HOT GASEOUS SUSPENSIONS OF CARBON BLACK. U.S. 2,594,171 (1952) April 22.

This invention relates to the manufacture of carbon black by the furnace process, and specifically to cooling the gaseous suspension of carbon as it leaves the furnace. Ordinary water quenching is considered inefficient and the invention proposes use of finely dispersed droplets produced with a fog nozzle so as to inhibit settling and provide more time and surface for evaporation. J. D. Parent

CARBON-BLACK SHIFT. *Oil Gas J.*, **51**, 87 (1952) May 12.

Use of natural gas for carbon black manufacture has dropped from 485,000 MMcf in 1947 to 411,000 MMcf in 1950, although the 1951 figure is 426,000 MMcf. Use of oil has increased from 20 million gallons in 1946 to 182 million gallons in 1951. Higher cost of gas is said to be the reason for this shift. In 1940 the gas to carbon black plants was valued at 1¢ Mcf., but this figure rose to 5.2¢ by 1951.

J. D. Parent

Desulfurization

Blohm, C. L. PROCESSING SULFUR BEARING GASES. *Petroleum Eng.*, **24**, C68-C74 (1952) April.

A brief review of processes for the removal of hydrogen sulfide from gases, and the subsequent recovery of sulfur is presented. The economics of the sulfur recovery process is discussed.

C. E. Hummel

Carlson, R. F. PACKAGED TREATER SWEETENS SOUR FIELD GAS FOR DRILLING ENGINES. *Oil Gas J.* **51**, 167, 168 (1952) May 12.

A skid-mounted package unit for sweetening gas by the amine process is described.

J. D. Parent

Gas Dehydration

Reid, L. S. ADVANCES IN GAS DEHYDRATION PROCESSES. *Petroleum Eng.*, **24**, D42-D50 (1952) May.

The author has presented a review of current dehydration processes. Flow sheets and a saturation moisture content chart are included.

J. D. Parent

Gas Gathering

Hindman, E. F. NATURAL-GAS GATHERING—ITS PROBLEMS AND HOW TO MEET THEM. *Oil Gas J.*, **50**, 240-243 (1952) May 5.

Hydrate formation, dispatching and corrosion for the natural gas gathering system are discussed. D. C. Gami

Schuster, R. A. PRODUCING AND GATHERING HIGH-PRESSURE GAS. *Oil Gas J.*, **50**, 186-189, 268 (1952) May 5.

The author describes the equipment and method used for gathering system at the Chicago Corporation. D. C. Gami

Gasoline Processes

Anderson, T. H., Jr. and Colburn, W. E. LIQUID RECOVERY FROM HYDROCARBON GASES. *Petroleum Refiner*, **31**, 137-141 (1952) April.

Processes for recovering natural gas liquids are reviewed. The manner of selecting the most economical process for a given case is discussed briefly. J. D. Parent

Chapin, W. F. MODERN AND UNIQUE DESIGNS FEATURED IN SNYDER GASOLINE PLANT. *Petroleum Refiner*, **31**, 119-124 (1952) April.

The most unusual feature of the Snyder gasoline plant is a 145 ton deethanizing absorber operating at 500 psi. It contains 24 trays in the absorption section and 26 in the stripping section. The upper section is 8 ft. wide and the lower section (from 34th tray down) is $8\frac{1}{2}$ ft. wide. Lean gas leaves the top of the column and deethanized rich oil leaves the bottom. A total condensing still regenerates the rich oil. The column combines the functions of the conventional absorber and rich oil deethanizer. A detailed flow sheet including analyses of streams is given. J. D. Parent

Hydrate Inhibitor

Woolfolk, R. M., Jr. METHANOL AS A HYDRATE INHIBITOR. *Oil Gas J.*, **50**, 124, 159-160 (1952) April 21.

This report on operation of an 18-mile gas line explains how hydrate formation was prevented by using only 1.85 gal. of methanol per million cubic feet of gas. Author's Abstract

LP-Gas Storage

Grant, W. INSIDE THE MODEL BULK STORAGE PLANT THAT EXPERIENCE BUILT. *LP-Gas*, 12, 51-54, 143-146 (1952) May.

Using their experience the Allen Butane Gas Company designed and built a LP bulk plant that is living up to their expectations for speed, safety and economy. Included are pictures of layout and equipment. B. G. Lang

Odorization Practise

Covell, P. L. CONTROLLING NUISANCE ODORS AT ODORIZATION STATIONS. Paper No. PC-52-19 Am. Gas Assoc., Operating Section, New York, May, 1952.

This article summarizes the experience gained during the past 25 years by the members of the AGA. Subcommittee on Odorization. Preferred types of equipment and installations, and methods of operation necessary for odor control are indicated. C. E. Hummel

Underground Storage

Riegle, J., Jr. STORAGE OF GAS IN A PARTIALLY DEPLETED OIL ZONE: PLAYA DEL REY FIELD, CALIFORNIA. Paper to Natural Gas Association, May 12-13, 1952, Los Angeles.

Unusual problems have been encountered using the partially depleted oil zone as gas storage for daily peak load demands. The three major problems encountered which affected the deliverability of the withdrawal wells and the storage capacity of the zone were, (1) the formation of an emulsion during withdrawal periods; (2) the entrapment of gas by fluid blocks, and (3) the gradual shrinkage of the reservoir by low head edge-water encroachment. The first two problems were solved by revising injection and withdrawal operations. The injection was permitted only in up-structure, while withdrawal started in down-structure wells and proceded up-structure only as far as necessary, to obtain the desired rates. Previously injection and withdrawals were from the same group of wells. The current daily withdrawal capacity is 33,000 Mcf at 1500 pounds discharge pressure. The overall efficiency of this structure taking into account the volumes remaining in storage as of January 1, 1952 has been over 85%. D. C. Gami

Transmission

Phillips, J. O. FM RADIO CONTROLS GAS TRANSMISSION. *World Oil*, 134, 258-259 (1952) April.

A complete radio control for operating a main-line block valve and taking pressures at remote locations is installed for Pan American Gas Company's Texas City terminal. A series of audio impulses carried over the VHF acts on a number of relays at the valve to cause high-pressure line gas to drive a pneumatic motor mounted on the elevated gear-works of the valve. D. C. Gami

Pipeline Pressures

Ribaud, M. G. ON THE PATTERN OF VARIATION IN GAS TRANSMISSION PIPELINES. (SUR LE REGIME VARIABLE DANS LES FEEDERS DE TRANSPORT DE GAZ). *J. Usines Gaz*, 76, 76-82, March; 110-115 (1952) April.

In the first installment formulas and calculations with examples are given for determining graphically the evolution with the time of a curve of pressure, and also the method of realization of an electrical set-up which permits, through the methods of analogy, the treatment of every real case for the practical operation of a pipeline. The second part of this study analyzes the evolution of pressures on a long-distance gas transportation pipeline with restriction to cases physically simple and possible, in the filling and emptying of the same feeder under a regime of permanent cooling. Some of these problems can be solved mathematically, at least according to the evolution of pressures. With some judicious approximations it is possible to fix certain real values, at least on the normal limits of exploitation of a pipeline. These approximations have been shown to be in good accord with the measurements, unfortunately

too incomplete, which have been worked on so far. Also predictions on this point have been made (on the pipeline of Est, before being put in service) on some systematic measurements leading particularly to flows decisively higher than those at a permanent regime. Those measurements would evaluate the limits of the results of calculations and permit the determination of the instantaneous quantity of gas stock in the delivery pipe. S. Sensi

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Johnson, A. B. REMOVAL OF CARBONYL SULFIDE FROM LIQUEFIED PETROLEUM GAS. p. 138

Nicol, D. L. INFLUENCE OF SUBSTITUTE GAS COMPOSITIONS IN INTERCHANGEABILITY WITH NATURAL GASES. p. 126

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Alcohol Synthesis

Parker, P. T. (assignor to Standard Oil Development Co.) SYNTHESIS OF ALCOHOL FROM OLEFINS, CARBON MONOXIDE AND HYDROGEN. U.S. 2,595,096 (1952) April 29.

The patent claims an improved process for the production of alcohols from olefins, carbon monoxide and hydrogen which consists of contacting reactants with a cobalt catalyst at less than 4500 psig usually around 3000 psig and 400° F. to produce oxygen compounds which are passed to a hydrogenation zone. The hydrogenation products are distilled to remove alcohols and the bottoms comprising acetates are subjected to a hydrogen reaction and then recycled to the hydrogenation zone to complete the process. H. A. Dirksen

Ammonium Sulfate

Bragg, C. G. FERTILIZER FROM REFINERY WASTES. *Petroleum Processing*, **7**, 502-507 (1952) April.

Since December 1950, the successful operation of an ammonium sulfate plant at the Torrance, Calif. refinery of the General Petroleum Corp. has simultaneously solved some of the problems of atmospheric pollution and waste acid-sludge disposal, while producing about 10 tons/day of fertilizer-grade ammonium sulfate. Usable fuel oil has been recovered from the acid sludge and several tons/day of hydrogen sulfide have been made available for elemental sulfur recovery. The waste acid-sludge contains 41 wt. % sulfuric acid, 14 wt. % water and 45 wt. % oil. The other waste stream, containing about 2% ammonia and 2% hydrogen sulfide, comes from the refining from the naturally-occurring nitrogen and sulfur in the California crude oil. The acid-sludge is neutralized by the second stream, two well-defined layers appearing, the aqueous one containing ammonium sulfate, the nonaqueous one oil; separation is accomplished by simple settling. Hydrogen sulfide is separated in the vapor state during the neutralization and recovered in an absorption unit.

J. I. Wrozina

Wolff, H. I. (assignor to Shell Development Co.) METHOD OF PURIFYING AMMONIUM SULFATE. U.S. 2,596,950 (1952) May 13.

Ammonium sulfate produced by reacting ammonia with petroleum refinery waste-acid is freed of sticky material by washing cyclically with a 3,4 or 5 C-atom aliphatic alhohol. The alcohol is recovered by distillation from the extraction and is recycled. The alcohol in the salt is recovered by drying in a heated gas and scrubbing the gas with aqueous solvent.

O. P. Brysch

Catalysts

Daussat, R. L. and Steele, C. T. (assigned to Standard Oil Development Co.) METHOD OF PREPARING CATALYSTS. U.S. 2,595,772 (1952) May 6.

An improved method of preparing mixed metal sulfide catalyst is claimed. The losses normally occuring from filtration and acid action are overcome by the use of a weak ammonium solution and subsequent evaporation of the non-acidic solution. H. A. Dirksen

Grote, H. W. (assigned to Universal Oil Products Co.) METHOD OF CATALYTICALLY REFORMING HYDROCARBONS. U.S. 2,596,-145 (1952) May 13.

A method is presented which simultaneously reforms hydrocarbons of high and low naphthene contents in a 2-stage process at approximately 750°-1000° F. in the presence of a platinum, alumina and halogen catalyst under hydrocracking conditions to convert to lower boiling paraffins. H. A. Dirksen

Drilling Mud

Gates, J. I. and Pfenning, G. E. NEW OIL-BASE EMULSION MUD HAILED AS VAST IMPROVEMENT. *Oil Gas J.*, **51**, 166, 168 (1952) May 12.

A new oil-base emulsion mud which is stable up to 250° F. and suitable for densities as high as 16.7 lbs. per gallon is discussed.

J. D. Parent

Fischer-Tropsch Catalyst

Black, J. F. and Kirby, K. K. (assigned to Standard Oil Development Co.) HYDROCARBON SYNTHESIS. U.S. 2,593,250 (1952) April 15.

An improved iron catalyst containing ferro silicon from which 1.5 to 3 weight percent silicon has been removed, is used to produce hydrocarbon from CO and H_2. W. J. Pleticka

Mulford, R. N. and Russell, W. W. CATALYTIC HYDROGENATION OF THE OXIDES OF CARBON TO HIGHER HYDROCARBONS. *J. Am. Chem. Soc.*, **74**, 1969-1974 (1952) April 20.

The effects of carbonate, chloride, sulfate, thiosulfate and sulfide, added singly as potassium or sodium salts prior to catalyst precipitation, upon ceria promoted, copper-containing cobalt catalysts in the syntheses of hydrocarbons from the oxides of carbon at atmospheric pressure have been studied. All of these cobalt catalysts produced oil when the initial carbon dioxide-hydrogen mixture was first passed over a supported iron, water gas catalyst, but with no water gas catalyst present only the cobalt catalysts containing potassium carbonate or sulfate produced oil. In general the effects of certain of these catalyst additives were to alter the distribution between liquid and gaseous synthesis products, to increase oil yields, and to shift the temperature range of maximum oil yields. The effects of the additives are attributed to selective activation and/or beneficial poisoning of the cobalt catalysts. Authors' Abstract

Oil Specifications

Resek, J. V. COMMERCIAL BURNER OIL SPECIFICATIONS. Am. Soc. Mech. Eng. Paper No. 51-A-125, Annual Meeting, November 25-30 (1951).

Due to the fact that various types of oil burners require oils that are limited in their specifications, it is suggested that a new Commercial Standard be adopted to supersede Commercial Standard CS 12-48. These new specifications would be divided into a No. 1 oil for pot type burners; No. 2 oil for domestic burners, particularly of the high-pressure oil atomization type; No. 5 oil for commercial and industrial burners requiring a cheaper oil that can be burned cold; and two grades of heavy oil, No. 6 and No. 7. Author's Abstract

Refining Synthetic Products

Burton, W. P. and Solomon, E. (assignors to The M. W. Kellogg Co.) SEPARATION OF ORGANIC COMPOUNDS. U.S. 2,595,223 (1952) May 6.

The process described uses an alkali either dry or aqueous to separate organic acids from a reaction mixture of other types of oxygenated organic compounds. The alkali used, preferably an alkali carbonate to prevent reaction with CO_2, is contacted with the reaction gases, and the organic acids are converted into their corresponding salts and are withdrawn from the contactor. After withdrawal the salts are reconverted to the acids by reaction with a suitable inorganic acid. The resultant mixture is passed to a separator and thence to a distilling tower for separation. W. G. Bair

Hess, H. V., Arnold, G. B. and Drabkin, M. L. (assigned to The Texas Company) VAPOR PHASE TREATMENT OF COMBINED GASOLINE AND WATER PHASES OF SYNTHESIS PRODUCT WITH A BASIC COMPOUND. U.S. 2,591,699 (1952) April 8.

Catalytic conversion of carbon monoxide and hydrogen into synthetic fuel is effected by contact with an iron catalyst at about 500 to 700° F. and a pressure of from 100 to 500 psi. The patent covers treatment and separation of the resultant gas phase, oil phase and water phase.

C. A. Hall

Shale Oil

Mapstone, G. E. A NOTE ON THE DISCOLORATION OF CRACKED SHALE GASOLINE. *J. Inst. Petroleum* (British), **38**, 192 (1952) March.

Quinones are found to condense with pyridine homologues to yield colored products. It is suggested that this reaction may account for the discoloration of shale gasoline on standing exposed to air. D. M. Mason

Mapstone, G. E. ALDEHYDE RESINS FROM SHALE TAR BASES. *J. Inst. Petroleum* (British), **38**, 180-191 (1952) March.

Shale-tar bases may be condensed with formaldehyde in acid solution to give acid-insoluble resins. Under suitable conditions a resin can be formed by the co-condensation of the bases and phenol. The condensation reaction appears to be analogous to that of phenol and formaldehyde in the presence of acid, first methylene groups of the a and y side-chains of the bases and phenol. The condensation reaction appears to be analogous to that of phenol and formaldehyde in the presence of acid, first methylene groups of the a and y side-chains of the bases having a similar reactivity to the ortho- and para-positions of phenol.

Author's Abstract

Schabelitz, E. J. PROCESS FOR THE EXTRACTION OF VALUABLE CONSTITUENTS FROM UNEXPOSED OIL-BEARING SHALES NOT SPENT BY OXIDATION. U.S. 2, 596,793 (1952) May 13.

A process is claimed wherein waxes, resins and oils are recovered from unweathered oil shales by extracting with methylene chloride for 1-5 hrs. at 35-40 deg. C. and 100-1500 psi. The products are concentrated by distilling off the solvent from the drained solution.

O. P. Brysch

Synthesis Gas

Barr, F. T. and Martin, H. Z. (assigned to Standard Oil Development Co.) MANUFACTURE OF GAS MIXTURES CONTAINING CARBON MONOXIDE AND HYDROGEN. U.S. 2,592,377 (1952) April 8.

Non-volatile fluidized carbonaceous solids are gasified with steam at 1600 to 1800° F. in a generator zone with or without pressures, the heat being provided by a fluidized bed of ferric oxide which gives up part of its oxygen to combustion of the carbon. The reduced oxide is reoxidized in a separate zone and recycled.

O. P. Brysch

Eastman, D. B., Barber, E. M., and Reynolds, B. (assigned to The Texas Co.) PROCESS FOR THE MANUFACTURE OF SYNTHESIS GAS. U.S. 2,591,687 (1952) April 8.

A method for preparing a mixture of carbon monoxide and hydrogen by the controlled combustion of a carbon-containing material in an internal combustion engine is claimed. The condition, 90% oxygen and a gaseous hydrocarbon (natural gas) preheated to 1000° F. at 50 psig fed in the ratio of 1.25 to 1, allow an indefinite operating period free of carbon.

H. A. Dirksen

Lynch, C. S. (assignor to Standard Oil Development Co.) REFORMING HYDROCARBON GASES IN THE PRESENCE OF A MAGNESIA CATALYST. U.S. 2,593,584 (1952) April 22.

A method for producing H_2 and CO from hydrocarbon using an oxidizing gas containing a major proportion of CO_2 with the use of a magnesia catalyst is claimed. A lack of carbon formation was found using 100% MgO as a catalyst though only 63% of the methane was reacted.

J. D. Parent

7. ANALYTICAL METHODS AND TESTS

Control Analysis

Patterson, W. A. and Devine, J. M. PROCESS CONTROL BY END-POINT ANALYSIS. *Chem. Eng.* **59**, 180-188 (1952) May.

Methods and instruments used for rapid analysis of products and their relationship to process control is discussed. Some of the instruments described are combustible gas analyzers, automatic titrators, mondispersive and dispersive type infrared spectrophotometers, X-ray diffraction instruments, emission spectrographs, mass spectrometers and electron microscopes.

D. V. Kniebes

Infrared Spectroscopy

Hastings, S. H., Watson, A. T., Williams, R. B. and Anderson, J. A., Jr. DETERMINATION OF HYDROCARBON FUNCTIONAL GROUPS BY INFRARED SPECTROSCOPY. *Anal. Chem.* **24**, 612-742 (1952) April.

Measurements of the infrared absorptivities of a number of pure paraffin, naphthene, and aromatic hydrocarbons were made in regions where the absorption is due to functional groups. This is the basis for characterization of complex mixtures where individual component analysis is not feasible.

D. V. Kniebes

Waters, J. L. and Hartz, N. W. AN IMPROVED LUFT-TYPE INFRARED GAS

AND LIQUID ANALYZER. *Instruments*, **25**, 622-627 (1952) May.

An improved nondispersive, continuous Luft-type infrared analyzer is described. Performance data on the instrument is given, and suggestions are made for some of its applications in industry. D. V. Kniebes

Methane Determination

Pritchard, F. W. A MODIFIED "THERMAL CONDUCTIVITY" GAS ANALYZER FOR MEASURING METHANE IN AIR OR CARBON DIOXIDE. *J. Sci. Instruments* (London) **219**, 116-117 (1952) April.

The thermal conductivity gas analyzer may be modified by increasing its cell dimensions so that the heat loss due to convection may be made appreciable. By measuring the heat loss due to convection for air and comparing it with the sample gas, the methane composition in a methane, air, and carbon dioxide mixture may be obtained. The heat loss may be obtained from the drop in temperature of the filaments sealed inside each cell. These filaments are connected to a bridge of the Wheatstone bridge circuit so that the change of temperature may be measured as a change in the filament resistance. The resistance change may be obtained by rebalancing the Wheatstone bridge circuit. S. Mori

Metals in Oils

Gunn, E. L. and Powers, J. M. ASH RESIDUES FROM PETROLEUM CATALYTIC CRACKING FEED STOCKS. *Anal. Chem.* **24**, 742-746 (1952) April.

A spectrographic method for routine determination of nine metals in oils is described. About three hours is required for a complete analysis of the metals ranging in concentrations of 0.1 to 10 p.p.m. D. V. Kniebes

Moisture in Gas

Brickell, W. F. THE DETERMINATION OF WATER VAPOR IN NATURAL GAS BY A DIRECT CHEMICAL METHOD. Paper No. PC-52-17 Am. Gas Assoc., Operating Section, New York, May 1952.

Application of ethylene glycol and Karl Fischer reagent to the determination of water vapor in natural gas has given satisfactory results under a wide range of conditions involving pressure, temperature, gas composition, and water vapor content. Over-all precision of the method is ± 1.2 lbs. with a mean standard deviation of 0.60 lbs. H_2O/MMcf. C. E. Hummel

Hadady, R. E. MOISTURE MEASUREMENT. *Instruments*, **25**, 600-602 (1952) May.

The factors of greatest importance in moisture measurement are dew-point range, accuracy, temperature range, speed of response, simplicity of operation, and relative price. Here are comparisons of various instrumental methods. Author's Abstract

Pore Distribution

McDermot, H. L. and Arnell, J. C. CHARCOAL SORPTION STUDIES. I. THE PORE DISTRIBUTION IN ACTIVATED CHARCOALS. *Can. J. Chem.* **30**, 177-184 (1952) March.

The pore distributions of three activated charcoals have been calculated from the low temperature nitrogen and water isotherms. The method of Barrett, Joyner, and Halenda has been used with the nitrogen data, while the Kelvin equation has been applied to the water isotherm. The two curves coincide if $\cos A = 0.65$ is used in the Kelvin equation, where A is the wetting angle. This figure is in general agreement with a published figure obtained by an independent method. Authors' Abstract

Sulfur Determination

Polson, D. S. and Strickland, J. D. THE DETERMINATION OF MICROGRAM AMOUNTS OF SULPHUR IN NITRATE OR CHLORIDE SOLUTIONS. *Analytica Chimica Acta*, **6**, 452-461 (1952) May.

It is shown that microgram quantities of sulphate can be "collected" with barium chromate when the latter is precipitated from solutions at a pH of about 1. The sulphate in this precipitate can be converted to hydrogen sulphide when the precipitate is treated at red heat with a mixture of hydrogen and hydrogen chloride vapor. The above procedure has been made the basis of a method for determining traces of sulphur, down to about 0.2 p.p.m. on a 10-g. sample, when the hydrogen sulphide is determined absorptiometrically as Lauth's violet. Authors' Abstract

8. GENERAL AND PHYSICAL CHEMISTRY

Carbonyl Sulfide Removal

Geisel, W. PROCESS OF PURIFYING GASEOUS CARBON DIOXIDE. U.S. 2,594,268; 2,594,269 (1952) April 22.

Carbonyl sulfide is almost completely removed from carbon dioxide by passing the gas over active carbon at 40° C. under 100-200 atmospheres pressure. Further treatment by passing the gas over nickel-copper catalysts at 220° C. under pressure effects complete organic sulfur removal. C. E. Hummel

Johnson, A. B., and Condit, D. H. (assigned to California Research Corp.) REMOVAL OF CARBONYL SULFIDE FROM LIQUEFIED PETROLEUM GAS. U.S. 2,594,311 (1952) April 29.

The carbonyl sulfide content of liquefied petroleum gas is reduced to less than 0.04 part per million by intimately mixing the hydrocarbon with aqueous monoethanolamine-caustic soda solutions at 100° F. and at 260 psi. pressure. Alcoholic potash and cresylic acid-sodium hydroxide solutions are also effective. The unstable emulsions which are formed are passed into a settling tank and the purified hydrocarbon is drawn off. C. E. Hummel

Flame Research

Dugger, G. L. and Heimel, S. FLAME SPEEDS OF METHANE-AIR, PROPANE-AIR, AND ETHYLENE-AIR MIXTURES AT LOW INITIAL TEMPERATURES. Nat. Advisory Committee for Aeronautics Technical Note 2624, Washington, (1952) February.

This article presents the results of determination of flame speeds for methane-air, propane-air, and ethylene-air mixtures at initial mixture temperatures of 73° C. and — 172° C. These results are correlated with previously determined high temperature data.

E. F. Searight

Penner, S. S., Gilbert, M., and Weber, D. SPECTROSCOPIC STUDIES OF LOW PRESSURE COMBUSTION FLAMES. *J. Chem. Physics*, 20, 522, 523 (1952) March.

Apparatus for determining rotational temperatures of low pressure combustion flames is discussed, and some preliminary data is presented for rotational temperatures of —OH in propane-oxygen flames. E. F. Searight

Wheatley, P. J. and Linnett, J. W. BURNING VELOCITY DETERMINATIONS. PART 8 — SOME ACETYLENE + OXYGEN + INERT GAS MIXTURES. *Trans. Faraday Soc.* (British) 48, 338-345 (1952) April.

The burning velocities of some acetylene + oxygen + inert gas mixtures at atmospheric pressure have been determined, the inert gases being nitrogen, argon, helium and carbon dioxide. The burning velocity seems to be governed considerably by the flame temperature. However, because the heat capacities of helium and argon are the same, when helium replaces argon the flame temperature is likely to be unaffected. Therefore the ratio of the burning velocities for mixtures containing helium and argon have been compared with the ratios of the thermal conductivities and diffusion coefficients for hydrogen and oxygen atoms and hydroxyl radicals. It is concluded that, in the flames considered, conduction of heat ahead of the flame cannot be the main factor in its propagation and probably that radical diffusion is more important. The effect of pressure on the burning velocity of two of the mixtures has been studied. The burning velocity seems to be unaffected by change of pressure. It is stressed that further research on the effect of pressure is required.

Authors' Abstract

Spectroscopy

Norrish, R. G., Porter, G., and Thrush, B. A. DETECTION OF DIATOMIC RADICAL ABSORPTION SPECTRA DURING COMBUSTION. *Nature* (British) 169, 582-583 (1952) April 5.

A spectroscopic examination of CH, C_2, CN, OH and NH radical concentration in flames is discussed. E. F. Searight

Thermal Conductivity

Freiling, J. Eckert, R. E. and Westwater, J. W. THERMAL CONDUCTIVITY OF ANISO-

TROPIC MATERIALS. *Ind. Eng. Chem.*, 44, 906-910 (1952) April.

An unsteady state method is used to determine the thermal conductivity of substances whose conductivity differs with direction in the material. Rectangular blocks of the material originally at uniform temperatures are suddenly immersed in an atmosphere of condensing steam and data obtained on the temperature of the center of the block. Simultaneous trial and error solutions of the linear second-order partial differential equation give values for k_x, k_y, k_z when three blocks of the material of different dimensions are used. The method gives an average conductivity over the range of quenching rather than the value at any given temperature. It is not good for porous materials. Values given are in btu/sq. ft./°F/ft. for four commercial materials. R. T. Ellington

Uhler, A., Jr. THERMAL CONDUCTIVITY OF FLUID ARGON AND NITROGEN. *J. Chem. Physics*, 20, 463-472 (1952) March.

The thermal conductivities of gaseous argon and nitrogen at pressures up to twice the critical and temperatures from the normal boiling point to well above the critical temperature are determined by means of the concentric cylinder method. The method is unique in that a constant temperature heat-sink is not used, and that gas thermometers were employed for temperature-difference measurement. The experimental data obtained are compared with the results calculated by the Kincaid and Eyring formula, by using the hard sphere model and classical mechanics, and by using the hard sphere model and quantum mechanics. The ratio of K calc/K exp. ranges from 0.65 to 1.30 for argon, and 0.81 to 1.14 for nitrogen.
R. T. Ellington

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Hastings, S. H. DETERMINATION OF HYDROCARBON FUNCTIONAL GROUPS BY INFRARED SPECTROSCOPY. p. 136

Smith, T. D. AMORPHOUS CARBON. p. 127

Waters, J. L. IMPROVED LUFT-TYPE INFRARED GAS AND LIQUID ANALYZERS. p. 136

9. ORGANIC CHEMISTRY

Ethylene Production

Carpenter, R. A. and Fowler, F. C. ETHYLENE BY STEAM PYROLYSIS OF ETHANE. *Petroleum Refiner*, 31, 148-149 (1952) April.

Experimental data is presented which shows conversions of ethane to ethylene as high as 60% per pass. These yields were obtained with the addition of steam, at temperatures above 1600° F. and contact times of the order of 0.014 seconds. H. A. Dirksen

Higher Mercaptans

Thompson, C. J., Meyer, R. A., and Ball, J. S. THERMAL DECOMPOSITION OF THIOLS. General Papers, Div. Petroleum Chemistry, Am. Chem. Soc. (1952) Milwaukee.

Analytical data are presented showing the effect of various residence times and temperatures on the decomposition of 1-pentanethiol and 2-methyl-2-propanethiol in a quartz tube. Hydrogen sulfide is the principal sulfur product formed. Mechanisms of these decompositions are discussed. C. E. Hummel

Pyridine Recovery

Schulte, E. V. (assigned to Koppers Co., Inc.) PROCESS FOR THE RECOVERY OF AMMONIUM SULFATE. U.S. 2,595,104 (1952) April 29.

Pyridine is recovered from the gas leaving the usual ammonium sulfate saturator by scrubbing with a spray of saturator makeup liquor acidified to from 6 to 15% acid content in a separate contact vessel. This liquor absorbs the remaining ammonia and pyridine from the gas, and is returned to the pyridine recovery process, which operates continuously on a side-stream of the saturator liquor. This secondary spray also recovers any residual ammonia in the effluent gas. O. P. Brysch

Tar Acids & Bases

Doughty, E. W., Murray, J. V., Jr., and Fales, J. D. (assigned to Union Carbide and Carbon Corporation) PROCESS FOR RECOVERY OF TAR ACIDS AND BASES FROM HYDROCARBON OILS. U.S. 2,595,516 (1952) May 6.

Tar acid and nitrogen bases are recovered from their mixtures with hydrocarbons by counter-

current washing with concentrated (20 to 40%) aqueous sodium phenolate solutions. The purified solution is then extracted with an oxygenated solvent (ethers, esters or ketones) such as diisopropyl ether, decanted and recycled. The ether solution is extracted with dilute H_2SO_4, decanted, and the ether-tar acid solution is then fractionated to yield pure tar acids as still bottoms and ether as overhead, the latter being recycled. The acid solution of nitrogen-base sulfates may be sprung to recover bases.

O. P. Brysch

10. CHEMICAL ENGINEERING

Contact Tower

Schneible, C. B. COLUMN APPARATUS. U.S. 2,596,104; 105; 106 (1952) May 13.

In a liquid-gas contact tower, the inventor utilizes the principle of superimposed baffle compartments, the baffles being supported from a central plate which is supported on a ring, so as to divert the rising gas outward in a rotating annulus. Here the down-flowing liquid is contacted and atomized. To provide circulation of greater quantities of liquid than can be atomized, different methods are provided for insuring downward flow of unatomized liquid in each patent: (1) the support-rings are perforated to allow flow down the tower walls; (2) the central plate is coned downward and the liquid flows down the center; (3) both methods are combined.

O. P. Brysch

Cooling Water Treatment

Oxford, W. F., Jr. COOLING-TOWER WATER TREATMENT. *Oil Gas J.*, **50**, 176-177, 263-264 (1952) May 5.

A discussion of the usefulness of surface active agents in cooling water treatment is described. A mixture of SP-8 and Ventol in equal proportion seems to be much more effective in corrosion and sludge control than the conventional chemical methods. This SP-8 Ventol system is much cheaper to use. Ventol is described in U.S. patent Re 23,277 and SP-8 in U.S. patent 2,589,195.

W. G. Bair

Fluidizer Operation

Ogorzaly, H. J. (assigned to Standard Oil Development Co.) CONTACTING SOLID PARTICLES WITH GASEOUS FLUIDS. U.S. 2,593,338 (1952) April 15.

The invention consists of a design change to minimize the pressure drop across the slide-valves in a fluid catalytic cracker. This reduces erosion and increases slide-valve life considerably. The main feature of the change is the insertion of a Venturi or orifice restriction downstream to the slide-valve. Piping is provided for introducing carrier gas between the restriction and the slide-valve and also downstream of the restriction. Thus the restriction can take the greater proportion of the necessary pressure drop and the drop across the slide-valve can be maintained at a constant low value. The magnitude of the pressure drop across the restriction can be varied by proportioning the amount of carrier gas introduced above and below the restriction.

W. G. Bair

Fractionation

Kapitza, P. L. RECTIFICATION APPARATUS. U.S. 2,593,763 (1952) April 22.

A centrifugal rectifying column is claimed, wherein each "plate" section is composed of a stationary and a rotating disc, each having several concentric cylindrical partitions so spaced that both series cooperate in increasing the surface of contact of the liquid which moves outward centrifugally from the center while the vapors move inward.

O. P. Brysch

Thornton, D. P., Jr. THE NEW 'BENTURI' FRACTIONATOR TRAY. *Petroleum Processing* 7, 623-627 May.

The "Kaskade" principle is utilized in this new design of "Benturi" tray. Bent venturi-shaped vapor slots are used, thus steamlining the vapor flow and reducing the pressure drop. Liquid head across the tray is held uniform, regardless of density and viscosity, by a combination of slanting the tray down from horizontal along with adjustments in number and spacing of baffles. Performance data on high and low pressure absorption and solvent extraction are given. Reduction in tower size and in pressure drop are two chief advantages of this new design.

D. C. Gami

Pulverization

Stephanoff, N. N., (ssigned to C. H. Wheeler Manufacturing Co.) APPARATUS FOR

TREATING MATERIALS IN SUSPENSION IN ELASTIC FLUID. U.S. 2,590,220 (1952) March 25.

A device is described for grinding material in suspension in a fluid, comprising a grinding chamber with nozzles and a classifying chamber.
E. J. Pyrcioch

Reaction Kinetics

Baron, T., Manning, W. R., and Johnstone, H. F. REACTION KINETICS IN A TUBULAR REACTOR. *Chem. Eng. Progress*, 48, 125-132 (1952) March.

A porous tubular reactor impregnated with vanadium oxide catalyst was used to study the rate of oxidation of SO_2. The data obtained were correlated on the basis of a theoretical equation describing conversion in a constant volume system as a function of the operating variables and equipment dimensions. It was found that the diffusional resistance to the oxidation reaction was less than 10% of the total resistance to reaction. The principles of momentum exchange between gas and adsorbed molecules on the catalyst afford a reasonable explanation for the effects of inert gas in the system on the rate and activation energy of the reaction.
C. von Fredersdorff

Size Separation

Evans, J. E. (assigned to Houdry Process Corp.) CLASSIFYING SYSTEM FOR PIECES OF SOLID MATERIAL HAVING UNEQUAL SIZE. U.S. 2,593,425 (1952) April 22.

This patent relates to a device for classifying solid particles of varying sizes followed by a distribution which results in essential uniform material as to particle size.
E. J. Pyrcioch

Tower Packing

Berl, E. FILLING BODY FOR GAS-LIQUID CONTACT TOWERS. U.S. 2,591,497 (1952) April 1.

A filling body having a volume to surface ratio of 1 to 29 is claimed for packing a reaction tower. Thin-walled hollow tetrahedrons bounded by 4 equilateral triangles with various arrangements of perforations are specified.
O. P. Brysch

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Analog Computor

Philbrick, G. A. and Paynter, H. M. THE ELECTRONIC ANALOG COMPUTOR AS A LAB TOOL. *Ind. Lab.*, 3, 8-13 (1952) May.

The history of computors in general and the recent developments in high-speed electronic analog computors are discussed. Typical problems which can be solved with the analog computor are described.
B. E. Hunt

Dust Removal

Edwards, R. W. (assignor to Celanese Corp.) GAS SCRUBBING DEVICE. U.S. 2,593,548 (1952) April 22.

A gas scrubbing device is described which efficiently removes dust or acid mists from gas streams. Gas enters the cylindrical vessel tangentially, and follows a helical path while it is scrubbed by a series of five sprays fed by a manifold positioned in the center. A baffle is employed to remove entrained water droplets from the gas.
C. E. Hummel

Wintermute, H. A. (assigned to Research Corporation) GAS CLEANING APPARATUS. U.S. 2,593,377 (1952) April 15.

This electrical precipitator includes an improved grounded screen-type electrode for flocculating the ionized dust particles and a second screen or filtering means separated in the gas stream to remove the flocculated particles. The grounded and filtering means are supported on removable frames.
O. P. Brysch

Fluid Metering

Baird, R. C., and Bechtold, I. C. DYNAMICS OF PULSATIVE FLOW THROUGH ORIFICES. *Instruments*, 25, 481-486 (1952) April.

Electrical analogies are made to orifice-metering problems. Included are field and laboratory data.
B. G. Lang

Heat Value Control

Bette, J. R. REGLAGE AUTOMATIQUE DU POUVOIR CALORIFIQUE DU GAZ DE FOURS á COKE. (AUTOMATIC CONTROL OF CALORIFIC VALUE OF COKE OVEN

GAS). *Revue Générale du Gaz* (Belgian) **74**, 55-56 (1952) March-April.

The main difficulties in establishing the gas calorific value with the classic calorimeters are cited. A detailed description is given of a U.S.A.-made automatic calorimixer, (first installation in Belgium in 1950) which reacts instantaneously to the changes of the gas quality (variation of the calorific power.) The calorimixer is set at a "zero", or desired output heating value, and deviations from this zero cause a pressure differential in a compressed air system which moves a mixing-regulator valve. This valve for example decreases the flow of blast-furnace gas into the mixed gas if the calorific value of the latter is below normal. An additional continuous calorimeter on the main gas stream operates to readjust the "zero" of the calorimixer. Precision of 1% is attained. S. Sensi

Pipe Locator

Eggleston, H. L., Jr. PIPE LOCATOR HELPS WITH MANY PROBLEMS. *Petroleum Eng.*, **24**, D70-D78 (1952) May.

The construction features and operating principles of the two-box pipeline locator are described in some detail. Operating techniques for locating pipe, tracing pipe, determining the depth of pipe, separating closely buried pipes, and locating various buried valves, fittings, etc. are described. B. E. Hunt

Thermocouple

Troy, W. C. et al. THERMOCOUPLE. U.S. 2,588,998 (1952) March 11.

A thermocouple made between tungsten and iridium of purity greater than 99% has the following desirable features for measuring temperatures between 1000 to 2000° C.: (1) the emf for the thermocouple is high compared to other known couples, is linear with temperature, and the sensitivity per degree is larger than any other known thermocouple; (2) there is no danger from change of calibration if the lower boiling point metal starts to boil off, as would be the case in an alloy-plus-pure-metal thermocouple; (3) the metals are stable at these temperatures under helium atmosphere; (4) changes in temperature below 100° F. is negligible, so no cold junction compensator is required. S. Mori

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Hadady, R. E. MOISTURE MEASUREMENT. p. 137

12. MATERIALS OF CONSTRUCTION

Aluminum Pipe

Moore, W. B., Jr. USE OF ALUMINUM PIPE IN OIL COUNTRY APPLICATIONS. *Petroleum Eng.*, **24**, D28-D32 (1952) April.

Aluminum pipe is now being used successfully in many petroleum industry applications,—heat transfer equipment, shot hole casing and temporary-portable lines. The use of aluminum pipe in gas and oil pipe lines is discussed. Aluminum pipe is not competitive with steel pipe under ideal conditions; however when installation costs become so high that a savings in installation expense can offset the higher price of aluminum, aluminum pipe should be considered. B. E. Hunt

Cast Iron Coolers

CAST IRON COOLING SECTIONS PARE COSTS, REPEL CORROSION IN COKE PLANTS. *Gas*, **28**, 49-50 (1952) May.

Gray cast iron has been used as a replacement for steel pipe in cooling equipment for wash-oil and ammonia liquors. The net result is a more compact assembly, increased corrosion resistance and lower operating and maintenance costs. B. E. Hunt

Cathodic Protection

Huddleston, W. E. CHECKING THE CATHODIC PROTECTIVE SYSTEM. *Petroleum Eng.*, **24**, D67-D68 (1952) May.

Many things can happen to a system under cathodic protection which will cause the system to be inadequately protected. Examples are given of some of the more common causes of inadequate system protection. B. E. Hunt

Robinson, H. A. MAGNESIUM RIBBON ANODE. *Gas*, **28**, 60-65 (1952) April.

Tests made on magnesium ribbon anodes have been conducted and proved the value of this type of installation. The use of ribbon anodes

is restricted to soils and waters of intermediate to high resistivity. They are intended as supplements rather than replacements for the cast anodes. B. E. Hunt

Corrosion Inhibitor

Murray, C. A. (assigned to The Pure Oil Co.) PREVENTION OF AMMONIUM SULFIDE CORROSION. U.S. 2,589,114 (1952) March 11.

The corrosion of catalytic cracking systems due to the presence of hydrogen sulfide, ammonia and water, and/or ammonium sulfide or hydrosulfide is inhibited by the injection of formaldehyde into the system. C. E. Hummel

Savoy, M. G. (assigned to Pure Oil Company) INHIBITORS AGAINST HYDROGEN SULFIDE AND BRINE CORROSION. U.S. 2,593,057 (1952) April 15.

Compounds from the group consisting of cellulose sulfate and alkali metal salts of carboxymethyl cellulose have been found effective in the inhibition of corrosion caused by brine solutions containing hydrogen sulfide.

B. E. Hunt

Heat Insulation

Schuman, E. C. HYDROUS CALCIUM SILICATE HEAT INSULATION. *Petroleum Eng.* 24, C55-C60, (1952) April.

A new type of insulator developed by the Owens-Illinois Glass Co. is discussed as to properties, and various shapes and sizes that are available on the market. It has good thermal insulating properties, will withstand temperatures up to 1200° F., and is quite rigid once it has been placed around the apparatus to be insulated. It has a density of 11 p.c.f., which makes it easily workable. S. Mori

INSULATING CEMENT. *Petroleum Eng.* 24, C75-C78 (1952) April.

A high-temperature insulating cement, designated commercial standard CS 117-49 Mineral Wool Insulation for Heated Industrial Equipment, is useful on high temperature equipment, as well as equipment having an irregular surface. Best techniques in the cement application for either a finishing coat on top of another insulator, or by using only mineral wool alone are described. S. Mori

Pipe Bending

Binckley, M. J. WHICH BENDING METHOD. *Gas*, 28, 122-129 (1952) May.

The relative merits of the five most commonly used methods of making bends in large-diameter pipe are discussed. The advantages and disadvantages of hot bending, cold wrinkle, smooth bending, wrought welding fittings, and miter angles are described. B. E. Hunt

Pipe Linings

Parker, M. E. CORROSION CONTROL. PART 52. CRUDE LINES, PRODUCTS LINES, TANKERS. *Oil Gas J.*, 50, 117, 119 (1952) April 28.

The interior corrosion of crude lines, product lines, and tankers has been combatted in a variety of ways. Crude lines have been lined with either cement or plastic; product lines have been protected by inhibitors; tankers have also been protected by the use of inhibitors. B. E. Hunt

Sneddon, R. CEMENT-MORTAR VS LINE REPLACEMENT. *Petroleum Eng.* 24, D51-D54 (1952) May.

Many cases have indicated that cement-lining for the protection of the internal surfaces of iron and steel pipe offer an effective and economical answer to line replacement. Two processes for applying the cement lining in the field are described. B. E. Hunt

Pipe Strength

Markl, A. R. FATIGUE TESTS OF PIPING COMPONENTS. *Trans. Am. Soc. Mech. Engrs.*, 74, 287-303 (1952) April.

This paper presents a compilation of available fatigue-test data on piping components and derives therefrom stress-intensification factors relative to straight pipe. These factors are strictly applicable only to the limited range of sizes for which fatigue tests were made. In view of the importance of proper consideration of stress intensifications in cyclically stressed piping and the lack of theoretical developments which would serve to evaluate their magnitude for all shapes involved, the author has taken it upon himself to suggest empirical correlations by which the application of the available data can be expanded to a wider range of sizes and conditions. Author's Abstract

Weld Corrosion

Orr, S. C. PREVENTING INTERGRANULAR CORROSION DUE TO WELDING STAINLESS. *Chem. Eng.*, 59, 286-296 (1952) March.

Intergranular corrosion is due to the formation of carbon chromium compounds which tend to deplete the grain boundaries of chromium, allowing corrosion to take place at these chromium-poor boundaries. These carbides are formed at a temperature of 1200° F. During the welding of stainless alloys a 1200° F. zone is present along the welding path and this zone is not corrosion resistant unless something is done to eliminate the carbide. Two methods, the use of very low carbon alloys and the addition of a stabilizing agent, columbium, are expensive and sometimes impractical. Columbium is a critical defense material and is not always available. Heat treatment can be used to accomplish the same purpose. The usual method is to heat the welded vessel to 1950° F., hold there long enough to achieve uniform temperature and quench rapidly to 800° F. (within three minutes.) At 1950° F. the chromium carbides go into solution again and the rapidity of the quench prevents their reformation.

W. G. Bair

Parker, M. E. CORROSION CONTROL. PART 51. WELD DECAY IN STAINLESS STEELS. *Oil Gas J.* 50, 179 (1952) April 21.

Intergranular corrosion results when austenitic stainless steels are heated (as in welding) to temperatures of 700°-1500° F. High carbon content increases the effect. Proper annealing by fast cooling from 1900°-2000° F., and addition of columbium and titanium will offset such corrosion.

O. P. Brysch

Weld Fittings

McLaughlin, C. B. and Tolliver, J. D. WROUGHT WELDING FITTINGS. *Gas*, 28, 110-120 (1952) May.

This article discusses the subject by a consideration of: (1) pipe bends versus wrought welding fittings, (2) where fittings are used, (3) design consideration of size, strength, and tangents.

B. E. Hunt

13. NEW BOOKS

Gas Analysis

Guérin, H. TRAITE DE MANIPULATION ET D'ANALYSE DES GAZ. (TREATISE ON MANIPULATION AND ANALYSIS OF GASES). Paris: Masson at Cie., Editors (1952)

This French book gives a very complete review of the methods of handling and analyzing gases. The book, after a brief historical discussion (Section I) contains four additional main sections: II, manipulation of gases (136 pages) in which are discussed in separate chapters, — the sampling and extraction; basic gasometric manipulations (sealing liquids, pumps, manometry, equipment); purification; storage; transfer and volumetric measurement (burettes, meters, orifices): III, general methods of gas analysis (160 pages) including separation,— by diffusion, fractional distillation, adsorption, solution, absorption; combustion analysis,— explosion, catalytic, fractional; mixture analysis, — by density, interferometry, viscosity, thermal conductivity, absorption spectrometry, mass spectrometry; combination methods; micro-analysis: IV, Determination of individual gases (180 pages) from argon to organic and metallic vapors: V, Application of gas analysis (195 pages) — in chemical research; combustion control; carbonization and gasification; petroleum industry; heavy chemical industry; metallurgy and glass; industrial hygiene and toxicology; biology. Because of the broad field of the subject, the descriptions of individual methods are concise, but the principles, reagents, manipulations and clear line drawings (310 figures) usually are given. The chapters on combustion, gasification and petroleum gases of Section V are brief but are well cross-referenced to the other sections of the book. Over 1500 references up to the year 1951 are cited in the author index, and a 17-page subject index is provided.

O. P. Brysch

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Bibliography of Technical Reports
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Industrial and Engineering Chemistry
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Industrial Heating
Institute of Fuel (British). Journal
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Institution of Gas Engineers. Bulletins, Communications and Transactions
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